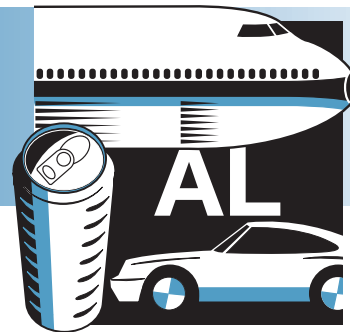


ALUMINUM

Project Fact Sheet



HIGH-EFFICIENCY, HIGH-CAPACITY, LOW-NO_x ALUMINUM MELTING USING OXYGEN-ENHANCED COMBUSTION

BENEFITS

- Increase in production rate up to 30 percent while maintaining NO_x emission rates below California's target for secondary aluminum melters
- Application to other combustion processes such as copper smelting, glass melting, and steel production
- Decrease in production cost and in revenue requirements for recycled aluminum
- Reduced CO₂ and volatile organic compound (VOC) emissions

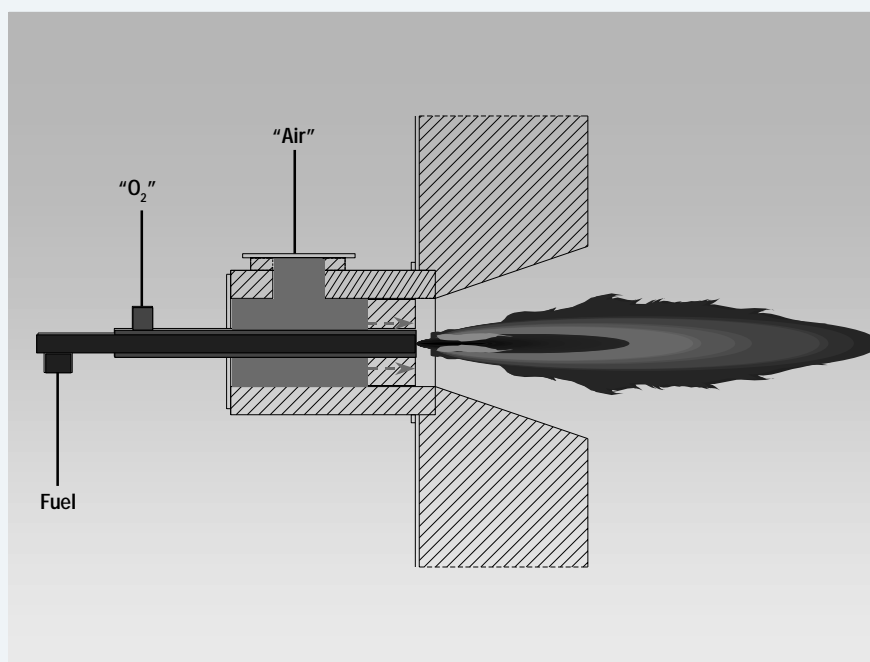
APPLICATIONS

The oxygen-enhanced combustion melting system can be retrofitted to reverberatory furnaces commonly used for melting recycled aluminum. Other metal melting operations can take advantage of this low-NO_x technology--including metal tolling and dross recovery operations and operations that melt zinc, lead, copper and other nonferrous and ferrous metals.

HIGH-CAPACITY MELTING FURNACES WILL REDUCE ENERGY CONSUMPTION, ENHANCE PRODUCTIVITY, AND LOWER EMISSION OF NO_x

Air Products & Chemicals, Inc., in cooperation with Argonne National Laboratory (ANL), Wabash Alloys, L.L.C., and Brigham Young University, will develop and demonstrate a novel, high-efficiency, high capacity, low-NO_x combustion system integrated with an innovative low-cost, on-site vacuum-swing-absorption (VSA) oxygen generation system. The integrated system will suit variable demand requirements and result in enhanced production rates and energy efficiency, as well as lowered operating costs and NO_x emission. Combustion air enriched from 35 to 50 percent levels will result in close to maximum improvement in heat transfer to melt, and in sufficient reductions in NO_x to meet environmental regulations. The system will help the U.S. aluminum industry overcome the problems associated with the inefficiency of the currently used melting furnaces, especially those in the casting sector of aluminum industry.

SIDE VIEW OF AIR-OXYGEN/FUEL BURNER



The Air-Oxygen /Fuel Burner provides high-efficiency operation, low natural gas consumption, and great flexibility in operation.



Project Description

Goal: Increase aluminum melting productivity up to 30 percent with low pollutants emission, accompanied by no increase in melting cost or need for large capital expenditures.

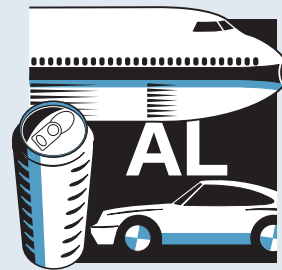
The project will be conducted in two phases. The first phase will include design and construction of the low-NO_x burner optimized for combustion air with 35 to 50 percent oxygen concentration. In the second phase, the VSA oxygen supply system will be integrated into the burner and is designed to meet average furnace demand. A proprietary oxygen storage system will also be incorporated to substitute for the less efficient practice of equipment sizing to meet peak furnace demand. The technology will be retrofitable to existing aluminum melting furnaces; adaptable to different furnace configurations, such as direct-charge and side-well reverberatory furnaces; and, flexible enough to melt different grades of scrap and end products. The technology will also be adjustable to meet increased stringent emission regulations expected in the future.

Progress and Milestones

- Low-NO_x burners have been designed and installed on a furnace at Wabash Alloys (formerly Roth Brothers).
- VSA design and construction is complete. VSA system is currently on-line at Wabash Alloys.
- Final optimization and performance characterization for the burners and VSA system will be completed early in 1999.
- ANL's virtual reality room, called Cave Automotive Virtual Environment (CAVE), will be used to improve fluid flow and temperature distribution within the Wabash Alloys' furnace. The CAVE is planned for demonstration in the first half 1999.

Commercialization Plan

- Wabash Alloys is expected to incorporate the technology permanently into its plant after successful demonstration.
- Air Products & Chemicals, Inc. will offer the burner and the integrated VSA oxygen supply. Air Products & Chemicals, Inc. will own and operate the VSA and sell the oxygen produced from it by negotiating multi-year contracts with customers. Burners will be sold to customers, while any proprietary aspects of the technology will be offered for licensing.



PROJECT PARTNERS

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